

**REMARKS**

The Office Action of September 26, 2000 has been received and its contents carefully considered.

Applicants have claimed priority based on Japanese Patent Application No. 213947/98 and Japanese Patent Application No. 356002/98. Certified copies of the priority documents were submitted on October 8, 1999. Applicants request the Examiner to acknowledge applicants' claim for priority and to acknowledge receipt of the certified copies of the priority documents.

The Examiner has attached to the Office Action a copy of the Form PTO-1449 filed with the Information Disclosure Statement of October 8, 1999, and a copy of the Form PTO-1449 filed with the Information Disclosure Statement of January 28, 2000.

The Examiner has initialed and dated these Forms to indicate that he has considered and made of record each of the references cited on these Forms, except for the two literature documents that were included on the Form PTO-1449 of January 28, 2000. The Examiner placed a line through these two literature references, but did not provide any explanation as to why he did not consider these two literature references. Applicants request the Examiner to consider these references and to send to applicants an initialed and dated Form PTO-1449 to indicate that he has considered and made of record each of these two references. Applicants enclose a new Form PTO-1449 which lists these references to facilitate the Examiner's consideration of these references and his sending a copy of an initialed and dated Form PTO-1449 to applicants. Applicants note that the identification on these two references on the Form PTO-1449 differs from the identification that appeared on the previous Form PTO-1449. If any

fee is required in connection with the filing of the present Form PTO-1449, please charge to Deposit Account NO. 19-4880.

Applicants further note that the Office Action contains an error with respect to the last name of the first named inventor. Applicants are concurrently filing a Request for a Corrected Official Filing Receipt asking for the correction of the inventor's name.

The Examiner objects to the Abstract because it contains legal phraseology. The Examiner particularly refers to the word "comprising" and to MPEP §608.01(b). Applicants submit that the Abstract is in compliance with the requirements of MPEP §608.01(b). Thus, MPEP §608.01(b) does not indicate that the word "comprises" is a word that should be objected to as containing legal phraseology. Accordingly, applicants request withdrawal of this rejection.

Claims 1-8 have been rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

The Examiner sets forth a number of reasons for this rejection in Paragraph 4, at page 2 of the Office Action. Applicants discuss each of these reasons below.

(a) The Examiner states that in claim 1, the step "subjecting alumina powder..., resulting in slurry dispersed in a solvent" is confusing because the claim does not set forth how the powder is converted to a slurry, and does not contain any previous reference to a solvent.

In response, applicants have amended claim 1 as set forth above to more clearly set forth the step intended to be recited. As can be seen from the above amendment, the alumina powder is dispersed in a solvent.

(b) The Examiner states that in claim 1, line 11, the word "having" should be changed to --has--. Applicants have amended claim 1 line 11 in the manner proposed by the Examiner to improve the wording of claim 1. In addition, applicants have added the word --and-- after "more" in line 12 to improve the wording of the claim.

(c) The Examiner states that in claim 1, last line, the word "side" should be changed to --size--. The Examiner does not provide any explanation as to why he believes the word "side" should be changed to --size--. Applicants submit that the word "side" in the last line of claim 1 is correct and that no change needs to be made. The word "side" is employed in the specification at page 5, line 6 from the bottom, and at page 6, last line. Applicants note that the word "side" is also employed in U.S. Patent 5,672,554 to Mori et al, which is of record.

(d) The Examiner states that in claim 2, the phrase "wherein an alumina powder adding a sintering agent" is confusing.

In response, applicants have amended claim 2 by changing the word "added" to --in mixture with-- to indicate that it is the mixture of alumina powder and sintering agent that is subjected to the treatment, such as the ultrasonic irradiation.

Further, applicants have amended the last two lines of claim 2 in a manner similar to the amendments made to claim 1 with respect to the formation of the slurry for the sake of improved consistency.

In view of the above, applicants submit that the claims comply with the requirements of 35 U.S.C. § 112, and, accordingly, request withdrawal of this rejection.

Claims 1-7 and 8 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 5,672,554 to Mori et al.

Applicants submit that Mori et al do not disclose or render obvious the presently claimed invention.

The present invention relates to a process for producing a polycrystalline alumina sintered body which comprises the steps of preparing a slurry by subjecting alumina powder and a solvent to ultrasonic irradiation, mechanical stirring not using a grinding medium, or ultrasonic irradiation and mechanical stirring not using a grinding medium, to provide a slurry of alumina dispersed in a solvent. The slurry is dried and formed to produce a green body. The green body is then sintered in an air atmosphere at a temperature in the range of 1400°C to 1800°C.

As set forth in claim 1, the alumina powder has a purity of 99.99 wt% or more, and comprises  $\alpha$  alumina particles having substantially no fractured surface. Claim 1 sets forth specific properties for the alumina powder.

In setting forth the rejection based on Mori et al, the Examiner has not explained his reasons for the rejection. It is applicants understanding, however, that the Examiner believes that the Mori et al patent discloses the step of subjecting alumina powder to ultrasonic irradiation. Applicants base their understanding on the fact that the Examiner makes such a statement in connection with an obviousness rejection which applicants discuss below.

The Mori et al patent at column 4, lines 14 and 16 discloses the use of "ultrasonication and stirring". This statement, however, is made in connection with the forming of a mixture containing transition alumina and/or a precursor thereof and a seed crystal, which mixture is then

to be calcined to prepare  $\alpha$  alumina. Mori et al do not disclose that an already formed  $\alpha$  alumina which is being used to prepare a sintered body should be subjected to ultrasonic irradiation.

Mori et al disclose that the  $\alpha$  alumina can be mixed with other ingredients to form a slurry for tape casting or slip casting. Mori et al disclose, at column 6, lines 31 to 33 and 61 to 63 that this mixing can be carried out by means of a ball mill or a vibration mill, each of which constitutes a grinding medium.

Accordingly, applicants submit that Mori et al do not anticipate the present claims because Mori et al do not disclose the step of subjecting an  $\alpha$  alumina powder to ultrasonic irradiation or to a mechanical stirring without grinding, but only disclose the step of subjecting a transition alumina to ultrasonic irradiation, and the step of subjecting an  $\alpha$  alumina to grinding to form a slurry. As set forth above, the present invention discloses subjecting an  $\alpha$  alumina powder to ultrasonic irradiation, or to mechanical stirring not using a grinding medium, or to ultrasonic irradiation and mechanical stirring not using a grinding medium.

In contrast, Mori et al disclose subjecting transition alumina to ultrasonic irradiation, and then using a ball mill or vibration mill when preparing an  $\alpha$  alumina slurry.

Further Mori et al do not disclose an  $\alpha$  alumina having no fractured surface as recited in claim 1. Uniform packing of particles results in a reduction in the number of pores. When there exists fractured surfaces, however, the uniform packing of particles cannot be realized because the  $\alpha$  alumina then has a non-uniform shape. See page 2, lines 6 to 15, and especially line 10, of the specification.

In addition, Mori et al do not disclose an  $\alpha$  alumina having a purity of 99.99 wt % or more as recited in claim 1. When the purity of  $\alpha$  alumina is less than 99.99 wt%, anomalous growth of particles can occur due to impurities, resulting in an increase in number of residual pores. See page 7, line 16 and page 8, last two lines to page 9, line 6 of the specification. Mori et al do not disclose or suggest such a purity for the  $\alpha$  alumina.

In view of the above, applicants submit that Mori et al do not anticipate claims 1-7 and 8 and, accordingly, request withdrawal of this rejection.

Claims 1 to 8 have been rejected under 35 U.S.C. § 103(a) as obvious over Mori et al.

Applicants submit that Mori et al do not disclose or render obvious the presently claimed invention.

In essence, the Examiner states that Mori et al teach a method for producing a polycrystalline alumina sintered body that includes the steps of subjecting alumina powder to ultrasonic irradiation, forming a slurry from the powder, drying and forming the slurry, and sintering the slurry in air at the claimed temperatures.

The Examiner further states that Mori et al also disclose the addition of the sintering aid, such as MgO, to the alumina, and disclose the claimed alumina powder characteristic.

As discussed above, Mori et al do not disclose subjecting an  $\alpha$  alumina powder to ultrasonic irradiation, but instead disclose subjecting transition alumina to ultrasonic irradiation. Mori et al disclose, at column 6, lines 31-33 and 61-63, that when it comes time to prepare a slurry for producing a green body, that conventional methods, such as a ball mill or a vibration mill, which are mechanical grinding methods, should be employed. Thus, Mori et al completely

lack the step of subjecting  $\alpha$  alumina powder to ultrasonic irradiation or to a mechanical stirring without grinding. Accordingly, applicants submit that Mori et al do not disclose or render obvious the presently claimed invention.

With respect to the specific characteristics of the  $\alpha$  alumina employed in the present invention, applicants point out that the present claims require a purity of at least 99.99%. Mori et al disclose a purity of not less than 99.95%, and do not refer to a purity of 99.99% or more. As discussed above, when the purity of  $\alpha$  alumina is less than 99.99%, anomalous growth can occur due to the presence of the impurities, resulting in an increase in the number of pores. See page 7, line 16 and page 8, last two lines to page 9, line 6 of the specification. Mori et al do not contain any disclosure or suggestion that a purity of 99.99 wt% should be employed.

Further, as discussed above, the Mori et al patent does not disclose that the  $\alpha$  alumina particles have substantially no fractured surfaces. Uniform packing of particles reduces the number of pores. When there exists a fractured surface, however, uniform packing particles cannot be realized because the  $\alpha$  alumina has a non-uniform shape.

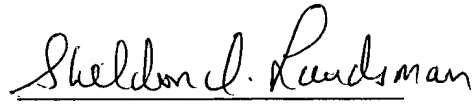
In view of the above, applicants submit that Mori et al do not defeat the patentability of the presently claimed invention, and accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. §1.111  
U.S. Appln. No. 09/361,118

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

A handwritten signature in cursive script that reads "Sheldon I. Landsman". The signature is written in dark ink and is positioned above the printed name and registration number.

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**APPENDIX**  
**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

The claims are amended as follows:

1. (Amended) A process for producing a polycrystalline alumina sintered body which comprises the steps of:

preparing a slurry by subjecting alumina powder and a solvent to ultrasonic irradiation, mechanical stirring not using a grinding medium, or ultrasonic irradiation and mechanical stirring not using a grinding medium, to provide a [resulting in] slurry of alumina dispersed in a solvent;

drying and forming said slurry to produce a green body; and then

sintering said green body in an air atmosphere at a temperature in the range of 1400°C to 1800°C;

wherein said alumina powder has [having] a purity of 99.99 wt% or more and comprises a polyhedral particle having substantially no fractured surface, and comprises  $\alpha$  alumina particles having polyhedral shape; a D/H ratio of from 0.5 or more to 3.0 or less, wherein D represents a maximum particle diameter parallel to the hexagonal lattice plane of a hexagonal close packed lattice of  $\alpha$  alumina, and H represents a maximum particle diameter perpendicular to the hexagonal lattice plane of a hexagonal close packed lattice of  $\alpha$  alumina; the number-average particle size of from 0.1  $\mu\text{m}$  or more to 1.0  $\mu\text{m}$  or less; a D90/D10 ratio of 7 or less, wherein D10

and D90 are the particle sizes at 10% cumulation diameter and 90% cumulation diameter, respectively, from the smallest particle side in a cumulative particle size distribution.

2. (Amended) The process according to claim 1, wherein an alumina powder in mixture with [added] a sintering agent is subjected to ultrasonic irradiation, mechanical stirring not using a grinding medium, or ultrasonic irradiation and mechanical stirring not using a grinding medium, to provide [resulting in] a slurry of alumina dispersed in a solvent.